<u>Amendments to the Claims:</u>

This listing of claims will replace all prior versions, and listings, of claims in the application.

<u>Listing of Claims:</u>

1. (currently amended) A method for operating an internal combustion engine, comprising:

operating the engine at a lean air-fuel ratio when a signal from a NOx sensor indicates that the exhaust stream contains less than a predetermined concentration of NOx, such NOx sensor being disposed downstream of an exhaust aftertreatment system, such aftertreatment system comprising: an injector; a nonthermal plasma discharge device <u>receiving the exhaust stream and</u> located downstream of the injector; and a NOx storage device located downstream of the nonthermal plasma discharge device; and

reducing an amount of electrical energy supplied to said nonthermal plasma discharge device when said NOx storage device is substantially full.

2. (original) The method of claim 1, further comprising: providing exhaust gases with a rich air-fuel ratio when said NOx storage device is substantially full.

3. (original) The method of claim 2, further comprising: determining whether said NOx storage device is substantially full.

4. (original) The method of claim 1, further comprising: increasing electrical energy to said nonthermal plasma discharge device when a signal from said NOx sensor indicates that exhaust gases contain more than said predetermined concentration of NOx and said NOx storage device is not substantially full.

5. (original) The method of claim 1, further comprising: increasing an amount of fuel supplied to said nonthermal plasma discharge device when a signal from said NOx sensor indicates that exhaust gases contain more than said predetermined concentration of NOx and said NOx storage device is not substantially full, said fuel being supplied by a fuel injector disposed in said engine exhaust upstream of said nonthermal plasma discharge device.

6. (original) The method of claim 3 wherein said NOx storage device is determined to be substantially full based on a model of the engine predicting engine generated NOx.

7. (original) The method of claim 3 wherein said NOx storage device is determined to be substantially full based on said signal from said NOx sensor.

8. (original) The method of claim 3 wherein said NOx storage device is determined to be substantially full when a signal from said NOx sensor indicates a NOx concentration exceeding a predetermined concentration.

9. (original) The method of claim 3 wherein said NOx storage device is determined to be substantially full when said signal from said NOx sensor indicates a NOx concentration exceeding a predetermined fraction of engine generated NOx, said engine generated NOx based on a lookup table based on engine speed and torque.

10. (original) The method of claim 3 wherein said NOx storage device is determined to be substantially full based on a lookup table based on engine speed and torque.

11. (currently amended) A method for operating an internal combustion engine, comprising:

providing an exhaust aftertreatment system coupled downstream of~~to~~ the engine, such exhaust aftertreatment system having an injector, a nonthermal plasma discharge device located downstream of the injector, a NOx storage device located downstream of the nonthermal plasma discharge device, and a NOx sensor located downstream of the NOx storage device;

determining a desired NO to NO2 conversion efficiency; and

providing a quantity of fuel and a quantity of electrical energy to the nonthermal plasma discharge device based on said desired conversion efficiency and minimizing a total effective fuel consumption by the nonthermal plasma discharge device.

12. (original) The method of claim 11, further comprising: determining said total effective fuel consumption as a sum of the quantity of fuel supplied to the nonthermal plasma discharge device and an equivalent fuel consumption quantity, said equivalent fuel consumption quantity is based on an amount of electrical power supplied to the nonthermal plasma discharge device, the overall efficiency of the engine to convert fuel energy into electrical energy, and the energy content of the fuel.

13. (original) The method of claim 12 wherein said overall efficiency of the engine is determined based on engine operating conditions.

14. (currently amended) The method of claim 11 wherein said exhaust aftertreatment system further comprises a NOx storage device located downstream of the nonthermal plasma~~s~~ discharge device.

15. (canceled)

16. (currently amended) A method to operate a nonthermal plasma discharge device in converting NO to NO2, the nonthermal plasma discharge

device being a component included in an exhaust aftertreatment system coupled to an internal combustion engine, the method comprising:

supplying a quantity of fuel to said nonthermal plasma discharge device;

supplying a quantity of electrical energy to the nonthermal plasma discharge device;

basing said fuel quantity and said electrical energy quantity on minimizing a total effective fuel consumption of the nonthermal plasma discharge device ~~The method of claim 15~~ wherein said total effective fuel consumption is based on a sum of said fuel quantity and an effective fuel consumption to provide said quantity of electrical energy.

17. (original) The method of claim 16 wherein said effective fuel consumption is based on the overall efficiency of the engine to convert fuel energy into electric energy and the energy content of the fuel.

18. (currently amended) The method of claim 16~~5~~ wherein said exhaust aftertreatment system further comprises a NOx storage device located downstream of the nonthermal plasma~~s~~ discharge device.

19. (currently amended) **A method for operating an internal combustion engine,** comprising:

operating the engine at a lean air-fuel ratio when a NOx storage device coupled to the engine exhaust is not full, said NOx storage device part of an exhaust aftertreatment system, such aftertreatment system further comprising: a nonthermal plasma discharge device located upstream of said NOx storage device wherein said nonthermal plasma discharge device receives an exhaust stream from the engine; and

providing exhaust gases with a rich air-fuel ratio when said NOx storage device is substantially full.

20. (original) The method of claim 19 wherein determination that said NOx storage device is full is based on a signal from a NOx sensor disposed downstream of said NOx storage device.

21. (original) The method of claim 19 wherein an amount of electrical energy provided to said nonthermal discharge device is reduced in response to said providing rich exhaust gases.

22. (currently amended) A method for operating an exhaust aftertreatment system coupled to an internal combustion engine, comprising:

increasing a quantity of fuel supplied to the exhaust aftertreatment system when a signal from a NOx sensor disposed proximate the exhaust aftertreatment system indicates NOx exceeds a predetermined level of NOx, wherein said exhaust aftertreatment system comprises a nonthermal plasma discharge device located downstream of said engine, a NOx storage device located downstream of said nonthermal plasma discharge device, and a NOx sensor located downstream of said NOx storage device.

23. (original) The method of claim 22 wherein said fuel is supplied by a fuel injector located in the engine exhaust upstream of said nonthermal plasma discharge device.

24. (original) The method of claim 22 wherein said NOx storage device is located downstream of the nonthermal plasma discharge device and said NOx sensor is located downstream of said NOx storage device.

25. (original) The method of claim 22, further comprising: increasing electrical energy to said nonthermal plasma discharge device based on a signal from said NOx sensor.

26. (original) The method of claim 25 wherein said increases in said electrical energy and increases in said quantity of hydrocarbons are coordinated.

27. (original) The method of claim 26 wherein said coordination is based on minimizing a fuel economy penalty.

28. (original) The method of claim 27 wherein said coordination is further based on maintaining a NOx concentration at the NOx sensor below a predetermined NOx concentration.